

The Discovery in the Upper Atmosphere by Means of the SOV/20-127-1-20/65
Third Sputnik of Electrons Having an Energy of About
10 kev

of the electron fluxes on their "equivalent" energy within the range of from -42 to -54° geomagnetic latitude in altitudes of from 1720 to 1880 km in the night of May 15, 1958 above the southern part of the Pacific. When the sputnik rotated round its two axes, the intensity of the electron fluxes changed considerably. The electron fluxes are probably the cause of the heating and expansion of the upper atmosphere (which was deduced from the slowing-down of the sputnik). There are 1 figure and 17 references, 9 of which are Soviet.

ASSOCIATION: Institut fiziki atmosfery Akademii nauk SSSR (Institute for the Physics of the Atmosphere of the Academy of Sciences, USSR)

PRESENTED: April 14, 1959, by A. I. Berg, Academician

SUBMITTED: April 14, 1959

Card 3/3

CONTRACTS: The collection consists of 15 articles dealing with scientific data on Soviet artificial earth satellites (AES) and cosmic rockets. The topics discussed include measurements of the density of the upper atmosphere, motion of AES, measurements of micrometeorites and meteoric matter, positive-ion masses, scale of cosmic rays, electrical potential, and spectrum of positivist ions. The collection is part of a series published regularly. References follow each article.

Iskhakymyulye yepitkeli smali, 779. 4 (Artificial Earth Satellites, No. 4) Moscow, 1960. 205 p. Extra ill. inserted. 6,500 copies printed.

Repr. Ed.: 2.7. Kuznetsov) Ed. of Publishing House) M.I. Pechkin; Tech. Ed.: I.I. Polukhov.

Abstract—The authors examined the effects of a 12-week, 1000 kcal energy deficit diet on the body composition and metabolic profile of 10 obese women. The subjects were randomly assigned to either a low-carbohydrate or a low-fat diet. Both groups lost weight and body fat, but the low-carbohydrate group lost significantly more weight and body fat than the low-fat group. The low-carbohydrate group also had a significantly higher resting metabolic rate and a higher percentage of weight loss due to fat loss. The authors conclude that a low-carbohydrate diet is more effective than a low-fat diet for weight loss and body composition improvement in obese women.

PLATE 1 BOOK IDENTIFICATION BOB/4281

Artificial Earth Cells, No. 4

804/2281

SHVARTS, YA.M. Method of Determining Electrical Potential of Holes in
PLASMA

161

MAKAREVA, T. M. Investigation of Microphobesites on the Third Soviet Antarctic Expedition.

265

Interdon, T.G. Some Results of the Measurement of the Mass of Positive Ions on the Third Soviet AEC

171

Measurements were made with a radio-frequency mass spectrometer on the third Soviet AKA at an altitude of 225 to 350 km and between 27° and 65° north latitude.

Shaffer, Yu.O., and A.V. Tsvetlin. Measuring Cosmic Rays on Geophysical
Reckon

284

Shklyarskiy, I. B. Artificial Comet as a Method of Optical Observation of Rosetta

195

relative errors. He discusses some Soviet and non-Soviet articles on the subject.

Card 5/6

9

PLATE 1 BOOK EXPLOITATION

SON/4413

International Council Pay Conference, Moscow, 1959.

Proceedings, V, III. Moscow, 1960. 253 p. Extracts only inserted. No. of copies printed not given.

Sponsoring Agency: International Union of Pure and Applied Physics, Council
May Commission.

Ed. B. I. Gryvenetskiy, Editorial Board: G. B. Zhukov (Ed.-in-Chief), I. P. Ivanenko (Associate Ed.-in-Chief), N. M. Gerasimov, A. I. Nikishov, V. I. Kalagin, B. A. Danilov, L. I. Birman, V. P. Malinov, G. I. Gryvenetskiy, V. M. Pedakov, Yu. M. Pavlov, and A. T. Abramov.

PURPOSE: This book is intended for physicists, astronomers and other scientists concerned with the earth's radiation belts and cosmic ray research.

COMMENT: This is Volume 9 of a timeline work compiling the proceedings of the Moscow Cosmic Ray Conference held July 6-11, 1959. This volume contains no reports on the earth's radiation belts and primary cosmic radiation. The reports delineated by Soris' acronyms are abstracted below. References accompany individual reports.

3. Reasons (Kromm), T. L., I. G. Shilov (Shilovskiy), O. I. Soloviy, and K. K. Svetitskiy (Svetitskiy)). On fast computers of the Upper Atmosphere 59-65

This paper presents experimental data on fast computers of the upper atmosphere and gives a detailed description of the equipment used in the experiment.

11. Doming, E. E. On the Problem of the Nature of Soft Radiation in the Upper Atmosphere
79-80

This paper summarizes the available data on bursts of soft radiation in the atmosphere and investigates the nature of the bursts in relation to processes on the sun, in coronal streams, and in the interplanetary medium. It also investigates the nature of these bursts in relation to the properties of the Earth's helios of radiation.

12. Arthur J. A. On the Nature of the External Radiation Belt of the Earth 81-82

II. PRIMARY SOURCE RADIATION

It is noted that the external radiation belt controlling the search is of nuclear origin, but that the explanation of the onset and accumulation of particles by the Earth's magnetic field in the course of its local variations are not controlling as an explanation of the nature of the external radiation belt. A more convincing explanation of the observed effects is given in this paper.

28. G. Garbuzov, A. G. and T. N. Garbuzova (Levchenko Physical Institute, USSR Academy of Sciences, Nuclear Physics Research Institute, Moscow University), *Energy Spectra of Primary Cosmic Particles*. This paper explains the results obtained from investigations of the electron component of cosmic radiation in the upper layers of the atmosphere. 129-135

23. Kobayashi, H., O. S. Sakurai, and Z. A. Glusko in: *Macromol. Spectrosc. of Combi. Mater.*, 1976, p. 103.

SOV/4946

PHASE I BOOK EXPLOITATION

Mukhaylov, A. A., ed.

Stantsii v kosmose: sbornik statey (Space Stations: Collection of Articles) Moscow, Izd-vo AN SSSR, 1959. 321 p. 25,000 copies printed. (Series: Akademiya nauk SSSR. Nauchno-populyarnaya Seriya)

Resp. Ed.: A. A. Mukhaylov; Compiler: V. V. Pedorov; Ed. of Publishing House: Ye. M. Kiyas; Tech. Ed.: D. Novichkova.

PURPOSE: This book is intended both for the space specialist and the average reader interested in space problems.

COVERPAGE: The book contains 73 short articles by various Soviet authors on problems connected with space travel and the launching of artificial earth satellites and space rockets. Some possibilities of future developments are also discussed. The articles were published in the period of 1957-1960. No person-alties are mentioned. There are no references.

III. ARTIFICIAL PLANET. FIRST ROCKET ON THE MOON

TASS Information. On the Launching of a Space Rocket to the Moon (January 13, 1959)	240
Dadary, A. N., Candidate of Physical and Mathematical Sciences. Is it Possible to Observe an Artificial Planet? (April 1959)	254
Barabashov, M. P., Active Member of the Academy of Sciences USSR. Artificial Earth Satellites and the Problem of Outer Space Flights (May 1959)	259
Kukarkin, B. V., Doctor of Physical and Mathematical Sciences. Launching of Space Rockets and Astronomical Problems (March 1959)	264
TASS Information. Launching of a Space Rocket to the Moon by the Soviet Union (September 13, 1959)	267
This Is the Way Lunnik Was Flying: (Investiya, September 15, 1959)	270
Mainich, A. G., Doctor of Physical and Mathematical Sciences. From the Earth to the Moon (September 15, 1959)	272
Shklovskiy, I. A., Doctor of Physical and Mathematical Sciences. How Is the Artificial Comet (September 15, 1959)	275
Shistovskiy, K. M., Candidate of Physical and Mathematical Sciences. On an Outer Space Course (September 15, 1959)	277
El'yushin, A. A., Corresponding Member of the Academy of Sciences USSR. In the Future - Manned Flight (September 17, 1959)	280
Yerdokimov, P. I., Candidate of Medical Sciences. From the Moon to the Earth (September 20, 1959)	284
TASS Information. First Results of Launching the Space Rocket to the Moon (September 21, 1959)	288
First Flight to the Moon (Trends, September 21, 1959)	291

500/211

PHASE I BOOK EXPLOITATION

International Cosmic Ray Conference. Moscow, 1959.
Proceedings. V. III. Moscow, 1960. 253 p. Errata slip inserted. 37. of
copies printed not given.
Sponsoring Agency: International Union of Pure and Applied Physics. Cosmic
Ray Commission.

Ed.: S. I. Syrovatskiy (Editorial Board: G. B. Zhurav (Ed.-in-Chief), I. P.
Ivanenko (Assistant Ed.-in-Chief), E. M. Gerasimov, M. I. Nikishov, V. I.
Katsenelenbaum, L. I. Drinov, L. P. Kulikov, S. I. Syrovatskiy, V. M.
Fedorov, Yu. N. Vavilov, and A. T. Abramov).

PURPOSE: This book is intended for physicists, astronomers and other scientists
concerned with the earth's radiation belts and cosmic ray research.

CONTENTS: This is Volume 3 of a 4-volume work containing the proceedings of
the Moscow Cosmic Ray Conference held July 6-11, 1959. This volume contains
40 reports on the earth's radiation belts and primary cosmic radiation. The
reports delivered by Soviet scientists are abstracted below. References
accompany individual reports.

III. THE ORIGIN OF COSMIC RAYS

196-204

33. Ginzburg, V. L. Some Aspects of the Theory of Cosmic Ray Orbits
This paper elucidates the following problem: 1) the main gas con-
centration in the galaxy (including the halo); 2) the role of
different cosmic ray sources; the injection mechanism and role of
the acceleration mechanism in sources; 3) the intergalactic
cosmic ray escape from the galaxy; 4) the intergalactic
space; the fraction of magnetic field in the galaxy;
5) the nature of cosmic ray/intergalactic medium interaction
connection with cosmic ray/intergalactic medium interaction
6) the origin of the cosmic ray electron component in the halo.

205-210

34. Shklovskiy, I. S. Achievements in Radioastronomy and Radioastronomical
Theory of the Origin of Cosmic Rays
This paper explains the radioastronomical theory of the
origin of cosmic rays on the basis of the latest achievements
in radioastronomy.

211-219

35. Kopylov, A. A. and G. I. Syrovatskiy (Syrovatskiy). On the Composition of
Primary Cosmic Rays
This paper points out the inadequacy in the explanations of the
composition of cosmic rays and presents another approach to the
solution of this problem.

219-228

36. Syrovatskiy (Syrovatskiy), I. S. Possible Acceleration of Cosmic
by the Electromagnetic Field of the Magnetic Dipole of the Earth
This paper presents the results of new calculations of the
electromagnetic field of a rotating dipole, as well as the
corrected analysis of the motion equations pertaining to this
field. Questions regarding the direct acceleration of particles
inertial and rotating systems of coordinates are considered, and
general conclusions with regard to the nature of distribution of
charge around a rotating dipole and with regard to analysis of
possible currents are made.

229-244

40. Kopylov, A. A. On the Initial State of Charged-Particle Acceleration
This paper analyzes the following problem: 1) interaction energy in a
solar flare in the case of charged-particle acceleration by the Fermi
acceleration mechanism; 2) acceleration of particles and
necessity of preliminary acceleration by the first order Fermi
mechanism; 3) acceleration of particles of the medium between
approximating magnetic clouds; 4) the case of relativistic
case, and the case of particle acceleration from very low
energies to relativistic energies; 5) acceleration of the plasma
particles in various specific cases; 6) acceleration of the plasma
column under laboratory conditions and under conditions of solar
flares, collisions of magnetic clouds in interplanetary and in
interstellar space, and collision of galaxies.

AVAILABLE: Library of Congress

SHKLOVSKIY, I. S.

Name : SHKLOVSKIY, I. S.

Title : Doctor of Physico-Mathematical Sciences.

Remarks : I. S. SHKLOVSKIY is the author of an article entitled "Here It Is, the Artificial Comet!" dealing with clouds of sodium vapors released from the second Soviet cosmic rocket.

Source : M: Stantsii v Kosmose (Stations in Outer Space), a collection of articles, published by the USSR Academy of Sciences, Moskva, 1960, with foreword by Academicians A. N. Nesmeyanov and A. V. Topchiyev, p. 275.

72 10

29717

S/169/61/000/008/033/053
A006/A101

3,1730 (1126,1127,1166)

AUTHOR: Shklovskiy, I. S.

TITLE: Achievements of radioastronomy and the radioastronomical theory of the origin of cosmic rays

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 8, 1961, 8, abstract 8658
("Tr. Mezhdunarodn. konferentsii po kosm. lucham, 1959, v. 3",
Moscow, AN SSSR, 1960, 209-215)

TEXT: Information is given on the sources of non-equilibrium radio radiation in the Galaxy, arising as a result of synchrotronous emission by electrons moving in magnetic fields. Such sources are: the galactic halo, the spiral structure of the disk in the galactic plane, the region about the Galaxy center and discrete sources, i.e. nebulae arising as a result of supernova bursts. The Sun is in the disk near the edge of the spiral arm; therefore radioastronomical data, pertaining to this area of the Galaxy are of greatest interest. In the closest surroundings of the solar system the concentration of relativistic electrons with $E > 10^9$ ev energy must be $N \sim 3 \cdot 10^{-13} \text{ cm}^{-3}$. This conclusion drawn from radioastronomical data is in agreement with the estimate of $N < 6 \cdot 10^{-13} \text{ cm}^{-3}$ ✓

Card 1/3

29717

S/169/61/000/008/033/053
A006/A101

Achievements of radioastronomy ...

which follows from the experimentally established fact on the absence of relativistic electrons in the composition of primary cosmic rays. The spiral structure of the radio emitting disk develops as a result of the fact that relativistic electrons originate in the spiral arms of the Galaxy (bursts of second-type supernovae, nuclear interactions of protons of cosmic rays in the clouds of interstellar gas) and then diffuse into the halo. Calculations show that in sources, identified with second-type supernovae remnants (Cassiopeia A type), about 10^{49} relativistic electrons are contained with $E > 10^9$ ev, and the total energy of electrons with $E > 2 \cdot 10^7$ ev in such an expanding nebula attains about $5 \cdot 10^{46}$ erg. The kinetic energy of an expanding nebula and the energy of the magnetic field enclosed, is about $10^{49} - 10^{50}$ erg. Therefore it can be assumed that the full energy of relativistic particles (mainly protons) developing during a supernova burst, attains about 10^{49} erg. It is mentioned that a number of known, extended regions of enhanced radio emission (Puppis A, Velus X type) are remnants of supernovae which burst several thousand years ago. Therefore the galactic disk of radio radiation can be conceived as a totality of such old, disintegrated supernova remnants. Simultaneously it is noted that the collision of heavy cosmic ray nuclei with hydrogen nuclei in the spiral arms of the Galaxy can fully explain the concentration of relativistic electrons observed in the

Card 2/3

29717

S/169/61/000/008/033/053
A006/A101

Achievements of radioastronomy ...

disk. This circumstance is most important if one considers that in virtue of maintaining the adiabatic invariant $\sin^2 \theta/H$, the relativistic electrons yielded by the supernova nebulae (where magnetic field H is intense) will not produce noticeable synchrotronous radiation. It is assumed that in the region of the galactic center, first type supernovae are the source of relativistic particles. In this region, concentration of relativistic electrons with $E > 10^9$ ev, attains $N = 1.5 \cdot 10^{-12} \text{ cm}^{-3}$ and their total amount is about $3 \cdot 10^{50}$. If bursts of first-type supernovae occur once in 10^4 years, then the number of relativistic electrons observed in the region of the galactic center will accumulate within merely 10^7 years. Apparently, the power of relativistic particle sources, located in the galactic spiral arms, exceeds the power of sources concentrated in the region of the galactic center.

N. Kaminer

[Abstracter's note: Complete translation]

Card 3/3

SHKLOVSKIY, I.S.

Nature of supernovae. Astron.zhur. 37 no.3:369-380 My-Je '60.
(MIRA 13:6)

1. Gosudarstvennyy Astronomicheskii institut im. P.K. Shternberga.
(Stars, New)

81850

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E032/E514

3.1730

AUTHOR: Shklovskiy, I. S.

TITLE: On the Nature of the Sag-A Source of Radio Emission

PERIODICAL: Astronomicheskii zhurnal, 1960, Vol 37, Nr 3,
pp 591-592 (USSR)

ABSTRACT: According to recent observations by Drake (Ref 1) it is rather probable that strong sources of non-thermal radio emission are absent in the galactic nucleus. The compact ($\sim 10''$) and very bright source observed in the nucleus is apparently of thermal nature and is due to ionized gas having a concentration of about 10^3 cm^{-3} . Two strong intensity maxima located on the "true galactic equator" symmetrically on either side of the nucleus and at a distance of about $45''$ are of a non-thermal nature. It should be noted that these two maxima have been observed by Mills (Ref 2) on 3.5 m. However, the relatively low resolution employed did not exclude other interpretations. Recent high resolution observations suggest that non-thermal sources of radio emission

Card 1/6

81850

S/033/60/037/03/024/027
EO32/E514

On the Nature of the Sag-A Source of Radio Emission

are distributed in a torus surrounding the galactic nucleus and having a radius of 100 parsec and a thickness of about 20 parsec. Its plane coincides with the plane of the "true" galactic equator determined by the distribution of interstellar hydrogen. The present author suggests that the distribution of sources of non-thermal radio emission about the galactic nucleus can be given a simple explanation. Owing to the high density of the gaseous interstellar medium in the neighbourhood of the galactic nucleus, a large concentration of relativistic electrons cannot be present in this region, since these electrons would relatively rapidly lose their energy by collisions with the hydrogen atoms. The energy losses by relativistic electrons (in eV/sec) can be represented by a formula of the form given by Eq (1) in which the first term represents ionization losses and the second radiation losses. This formula has been given by Ginzburg in

Card 2/6

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81850
S/033/60/037/03/024/027
E032/E514

On the Nature of the Sag-A Source of Radio Emission

Ref 4. When $n = 10^3 \text{ cm}^{-3}$ and $E = 10^9 \text{ eV}$, we find that $dE/dt = 1.1 \times 10^{-3} \text{ eV/sec}$ and, consequently, an electron is already considerably retarded after about 3×10^4 years. Since in the whole Galaxy there are about 10^{11} stars of type II population and one type I supernova explodes after approximately each 300 years, it follows that in the neighbourhood of the nucleus, where the number of stars according to Rougoor and Oort (Ref 3) is about 10^8 , such explosions will occur at intervals of a few hundred thousand years. This means that the relativistic electrons will be practically completely retarded between these explosions. On the other hand, the inflow of relativistic electrons into the region of the nucleus from the outer regions of the Galaxy is assisted by the presence of a relatively high interstellar magnetic field. Thus, the absence of non-thermal synchrotron radiation in the neighbourhood of the galactic nucleus can be explained quite

Card 3/6

81850

S/033/60/037/03/024/027
E032/E514

On the Nature of the Sag-A Source of Radio Emission

naturally. Beginning at a distance of about 50 to 100 parsec from the centre, the density of the interstellar gas according to Rougoor and Oort (Ref 3) is sufficiently small to favour the "accumulation" of relativistic electrons. At the same time the magnetic field in this region is still sufficiently large and possibly larger than in the neighbourhood of the sun by an order of magnitude. According to Mills (Ref 2) the brightness temperature of non-thermal radio emission on 3.5 m in the neighbourhood of the torus surrounding the galactic nucleus is close to 35 000°. After the background is subtracted, the brightness temperature is reduced to about 10 000°. Since the extension of the emitting region along the line of sight is about 100 parsec, it follows that $\Delta T_b / \Delta \ell \approx 100^\circ \text{K/parsec}$. On the other hand, according to Mills (Ref 5), $\Delta T_b / \Delta \ell \approx 2^\circ \text{K/parsec}$ in the spiral arms of the Galaxy as measured on 3.5 m. Since

Card 4/6

4

81850

S/033/60/037/03/024/027

E032/E514

On the Nature of the Sag-A Source of Radio Emission

$\Delta T_b / \Delta \nu$ is proportional to ϵ_ν , i.e. the spectral density of the radio emission per unit volume, it may be concluded that in the neighbourhood of the Sag-A source ϵ_ν for non-thermal radio emission is greater by a factor of 50 than in the neighbourhood of the sun. According to the theory of synchrotron radio emission ϵ_ν is given by Eq (2) if the differential energy spectrum of relativistic electrons is of the form $dN(E) = KE^{-\gamma} dE$. Observations suggest that $\gamma = 2.4$ and hence it follows from Eq (2) that if H_1 in the neighbourhood of the Sag-A source is greater by a factor of 10 than in the neighbourhood of the sun, then if K remains the same ϵ_ν will be greater by a factor of 50. As the distance from the centre is increased, the velocity of unordered motions of gaseous masses decreases relatively rapidly and hence the interstellar magnetic field will also decrease. ϵ_ν will decrease even more rapidly. This may explain the

Card 5/6

81850

S/033/60/037/03/024/027

E032/E514

On the Nature of the Sag-A Source of Radio Emission

presence of a rapidly sharp boundary in the torus of non-thermal radio emission which surrounds the galactic nucleus. Thus, the Sag-A source of non-thermal radio emission can be explained without assuming a large concentration of relativistic electrons near the centre of the Galaxy. The observed properties of this source are simply a reflection of the specific conditions which exist in the central regions of the Galaxy.

There are 5 references, 1 of which is Soviet and 4 English.

(Note: This is a slightly abridged translation)

SUBMITTED: April 3, 1960

Card 6/6

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E052/E314

AUTHORS: Gringauz, K.I., Kurt, V.G., Moroz, V.I. and
Shklovskiy, I.S.

TITLE: Results of Observations Obtained with the Aid of
Charged-particle Traps Mounted on Soviet Cosmic
Rockets at Altitudes up to 100 000 km

PERIODICAL: Astronomicheskii zhurnal, 1960, Vol. 37, No. 4,
pp. 716 - 735

TEXT: The ionized gas and energetic electrons in interplanetary space were investigated with the aid of three-electrode charged-particle traps mounted on three Soviet cosmic rockets. These traps are the result of further development of instruments based on probe methods. Four three-electrode ion traps were mounted on the spherical container carried by the first Soviet cosmic rocket launched in the direction of the Moon on January 2, 1959. Each trap consisted of three hemispherical and concentrically-mounted electrodes whose radii were 60, 22.5 and 20 mm, respectively. The two outer electrodes were fine metal grids, while the third electrode was continuous and served as the collector of the charged particles. The potentials relative to the body of the container

Card 1/9

83233
S/035/60/037/04/009/012
E032/E314

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

were as follows: collector 90 V; intermediate grid g_1 - 200 V;
the outer grid g_2 + 10 V and 0 V in the case of two of the four
traps. The potential of the outer grids of the other two traps
was +15 V and their collectors were connected together. The
general arrangement of electrodes in these three-electrode ion
traps is indicated in Fig. 1. The first grid (g_1) served to
suppress the photocurrent from the collector produced under the
action of the solar radiation and other radiations incident on the
collector. This grid also suppresses secondary electrons emitted
by the collector. All the traps were located in the meridional
plane of the container. Different potentials were given to the
outer grids in order to estimate the energy of the positive
particles entering the traps and, in particular, to distinguish
between currents due to stationary gas particles (energies of
the order of 1 eV) and currents due to protons in the corpuscular
streams, whose energies are higher by two or three orders of

Card 2/9

83233

S/033/60/037/04/009/012

E032/E314

Results of Observations Obtained with the Aid of Charged-particle Traps Mounted on Soviet Cosmic Rockets at Altitudes up to 100 000 km

magnitude. Current amplifiers were provided and positive currents between 10^{-10} and 5×10^{-9} and negative currents between 10^{-10} and 2×10^{-9} A could be measured. In the case of the second cosmic rocket the potentials of the outer grids (g_2) were -10, -5, 0

and 15 V, respectively. The collectors and the inner (anti-photoelectric) grids were plane. The traps were located at the corners of a tetrahedron inscribed into a sphere. In these traps the photoelectrons due to solar radiation and emitted from the outer grid do not reach the collector and the collector photocurrent is completely suppressed by the electric field between the collector and the inner grid. Photoelectrons from the latter are partly ejected from the trap or strike the outer grid and are partly intercepted by the collector giving rise to a negative current in the collector circuit. In this way, the negative current in the collector circuit due to the illumination of the inner grid

Card 3/9

83233

S/033/60/037/04/009/012

E032/E314

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

was reduced by an order of magnitude compared with the traps
mounted on the first rocket. Most of the aluminium surface of
the container was covered by an Al_2O_3 coating (or film). If the potential
on g_2 is less than kT/e then the positive ions due to the
stationary interplanetary gas penetrate into the space bounded
by g_2 , are accelerated in the field between g_1 and g_2 and,
on passing through g_2 , enter the collector. Thus "0 volt",
"-5 volt" and "-10 volt" traps should record ions due to the
stationary plasma which would be larger for lower values of the
potential on g_2 . If the latter is very much greater than
 kT/e , then the ions will not pass through g_2 and the +15 V trap
will not record ions due to the stationary gas with a temperature
of, say, 10 000 K. The electrons due to the ionised gas do not
enter the collector since they are ejected by the field between
Card 4/9

83233

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E052/E314

Results of Observations Obtained with the Aid of Charged-particle Traps Mounted on Soviet Cosmic Rockets at Altitudes up to 100 000 km

g_2 and g_1 (200 V). However, energetic electrons belonging to the radiation belts cannot be stopped by the g_1 grid and electrons with energies greater than 200 eV give rise to negative collector currents. Measurements obtained with these traps were corrected for the effect of the potential of the container and its motion. Fig. 6 shows the currents measured on September 12, 1959 at altitudes up to 25 000 km, using traps with $V_{g_2} = 0$ and

+15 V. The translational motion of the container is accompanied by the simultaneous rotational motion and hence the orientation of each trap relative to the velocity of the container and the direction of the Sun varies continuously. The maximum and minimum values of the collector current correspond to certain definite orientations of the container. In order to exclude the effect associated with the rotation of the container, the

Card 5/9

83233

S/033/60/037/04/009/012

E032/E314

Results of Observations Obtained with the Aid of⁴ Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

experimental results can be shown in the form of curves connecting the maximum and minimum values of the collector currents. In Fig. 7, Curves 1, 2, 3 and 4 are the upper limits of the recorded values of collector currents with the potential of the outer grids relative to the container equal to -10, -5, 0 and +15 V, respectively. Curve 5 is the lower boundary of the collector currents for three traps, in which the potential of the outer grid relative to the body of the container was negative or zero. These curves show the considerable dependence of the current due to positive particles reaching the collector on the potential of the outer grid. At altitudes exceeding 3 000 km the positive potential of the outer grid retards the positive ions almost entirely and prevents them from reaching the collector. The lack of similarity between Curves 1, 2 and 3 can be ascribed to changes in the orientation of the traps relative to the velocity vector and the direction of the Sun. Fig. 8 shows the data obtained with the second cosmic rocket. The upper continuous curve shows the

Card 6/9

83233

S/033/60/037/004/009/012

E032/E314

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

upper boundary of the measured values of the currents in three
traps with the outer grid potentials negative and zero. The dotted
curve represents the upper boundary of the values of the collector
current for the trap with outer grid potential equal to +15 V.
The lower curve is the lower boundary of the measured collector
currents in all the traps. In this part of the trajectory (25 000
- 100 000 km) the positive collector currents are practically absent
from all the traps while near 60 000 - 70 000 km the collector
currents in all the traps are simultaneously negative. Fig. 9 shows
the upper boundary of the values of collector currents for traps
with negative and zero outer grids, respectively. The crosses refer
to $V_{g_2} = -10$ V and the open circles to $V_{g_2} = 0$ V. These were
recorded using traps mounted on the first cosmic rocket. Fig. 10
shows the currents for the "25 V" and the "-10 V" traps recorded
at altitudes up to 8 000 km. The "25 V" results are represented
by the triangles and the "-10 V" results by the points. These results
Card 7/9

83233

S/033/60/037/004/009/012

EO32/E314

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

are still being examined. The final conclusions are summarised
as follows:

- 1) the Earth is surrounded by a plasma having an ion concentration of $\sim 10^3 \text{ cm}^{-3}$, which extends to $R \approx 22\ 000 \text{ km}$. The density of this plasma, which can be looked upon as the ionised component of the "geocorona", decreases regularly with altitude.
 - 2) The concentration of interplanetary ionised gas in the neighbourhood of the Earth is less than 100 cm^{-3} and very probably less than 30 cm^{-3} .
 - 3) In the region of the radiation belt there are few electrons having energies greater than 200 eV. In the region between 55 000 and 75 000 km, the concentration of these electrons reaches a maximum. It follows that the energy spectrum of the electrons in the region of the maximum of the outer radiation belt is much harder than beyond its outer boundary.
 - 4) A new radiation belt has been established. This belt surrounds the Earth and is located between 55 000 and 75 000 km. It consists
- Card 8/9

83233

S/055/60/037/04/009/012

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

of electrons with relatively low energy (although greater than
200 eV). Further studies of this new radiation belt are said
to be urgently required.

There are 11 figures, 1 table and 26 references: 1 German,
10 English and 15 Soviet.

ASSOCIATIONS: Radiotekhnicheskiy institut Akademii nauk SSSR
(Radiotechnical Institute of the Ac.Sc., USSR)
Gos. astronomicheskiy in-t im. P.K. Shternberga
(State Astronomical Institute imeni
P.K. Shternberg)

Card 9/9

EL921

9.9100 (2101,1041,1046)

S/C33/60/037/005/019/024
E032/E314

AUTHORS: Shklovskiy, I.S., Moroz, V.I. and Kurt, V.G.

TITLE: On the Nature of the Earth's Third Radiation Belt ✓

PERIODICAL: Astronomicheskii zhurnal, 1960, Vol. 37, No. 5,
pp. 931 - 934

TEXT: Results obtained with the aid of ion traps set up on Soviet cosmic rockets indicate the presence of a third (outermost) radiation belt (Ref. 1). This belt consists largely of relatively soft electrons with energies greater than 200 eV. In the region of the so-called second radiation belt and up to altitudes of about 50 000 km the flux of electrons with energies greater than 200 eV is less than $2 \times 10^7 \text{ cm}^{-2} \text{ sec}^{-1}$. On the other hand, in the region $55\ 000 < R < 75\ 000$ km the flux is about

$2 \times 10^8 \text{ cm}^{-2} \text{ sec}^{-1}$. Thus (as was shown in Ref. 1), the second belt should consist mainly of electrons having relatively high energies (a few hundreds of keV) and these electrons move in the magnetic trap. The problem therefore arises as to what is the nature of the electrons forming the third (outermost) radiation

Card 1/3

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S/C33/60/037/005/019/024
E032/E314

On the Nature of the Earth's Third Radiation Belt

belt. In this connection it must be emphasised that both during the January and September launchings of Soviet cosmic rockets the solar activity and the magnetic disturbances were at a low level. However, there are grounds for supposing that even during periods of low activity the Sun constitutes a source of a permanent though relatively weak corpuscular emission, i.e. it gives rise to the so-called "solar wind". It is argued that the third radiation belt is formed as a result of the interaction of this "solar wind" and the Earth's magnetic field and this leads to a redistribution of the energy, resulting in a net transfer from the protons to the electrons. The third radiation belt is a formation characteristic of magnetically quiet periods, when solar activity is low. It may be expected that during periods of high solar activity, when intense corpuscular streams reach the Earth's atmosphere, both the third and second belts will be deformed, and their characteristics will be strongly affected. It is suggested, therefore, that the experiments should be repeated at periods of high solar activity.

Card 2/3

87243

3.1730 (1126, 1127, 1129)
6.9417

S/033/60/037/006/001/022
E032/E514

AUTHOR: Shklovskiy, I. S.

TITLE: Radio Galaxies

PERIODICAL: Astronomicheskii zhurnal, 1960, Vol.37, No.6, pp.945-960

TEXT: The present paper is sub-divided into the following sections: 1) Critique of the hypothesis of colliding galaxies; 2) Cygnus A and Centaurus A as sources of the same type but at different stages of evolution; 3) The nature of radio galaxies. In the first section the author argues against the collision mechanism as a reason for the radio emission of the Cygnus A source. Thus, the spectrum of Cygnus A obtained by Minkowski with a slit position angle of 90° (Ref.1) (the slit intersected both the bright condensations which were interpreted by this author as the colliding galaxies) does not indicate the presence of any difference in the radial velocities of these condensations. From this it may be concluded that the relative radial velocity of the two condensations cannot exceed 100 to 200 km/sec. On the other hand, on the present scale of metagalactic distances the distance of Cygnus A is about 220 Mpc. Burbidge (Ref.6) and Shklovskiy (Ref.7) have estimated the minimum value of the energy of relativistic

Card 1/6

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E032/E514

Radio Galaxies

particles and the magnetic field in this source on the basis of the synchrotron radiation theory. Using the present scale of distances, this minimum energy was found to be of the order of 5×10^{60} erg (Ref.6). According to the colliding galaxy hypothesis, the kinetic energy of interstellar gas should serve as the source of energy of the relativistic particles and of the field. If one accepts the interpretation given by Minkowski and Baade in Ref.1 that the colliding galaxies are in fact gigantic spirals of late types, then the mass of the gas in them can hardly exceed $\sim 2 \times 10^{43}$ g. In order to satisfy the various energy relationships, it is necessary to assume that the relative collision velocity should be greater than 7000 km/sec. Comparison of this figure with spectroscopic data for Cygnus A clearly shows that the colliding galaxy hypothesis cannot be correct. Next, Cygnus A has an absolute magnitude of 21.3. V. A. Ambartsumyan has frequently emphasized that the probability of collision of two gigantic galaxies is negligible so long as collisions between galaxies with ordinary characteristics remain unobserved. Ambartsumyan has also drawn attention to an important feature of radio galaxies, namely, the fact that they are

Card 2/6

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E032/E514

Radio Galaxies

all objects with exceptionally high optical luminosity. This fact contradicts the colliding galaxy hypothesis and can be used as one of the arguments in support of the theory that radio galaxies form a special class of galaxies. Moreover, observations suggest that the emission line λ 3727 originates from a gas cloud whose linear dimensions are of the order of 30 kpc. Even if the kinetic temperature is very high, it can be shown that the electron and even proton concentration should not be less than 0.05 cm^{-3} . It follows that the mass of the interstellar gas in Cygnus A should be of the order of $3 \times 10^{10} M_{\odot}$ or even more. A galaxy with such a high amount of gas in it can only be a very peculiar object. It seems improbable that two peculiar galaxies with such exceptionally high gas contents should collide. One of the basic arguments put forward in support of the colliding galaxy hypothesis in the case of Cygnus A is the existence of two bright condensations close to each other in that source, and this is interpreted as representing the nuclei of two colliding galaxies. However, the present author pointed out as far back as 1953 (Ref.2) that this can be interpreted as a single peculiar galaxy with a wide dark band across the middle, X

Card 3/6

87243

S/033/60/037/006/001/022
E032/E514

Radio Galaxies

similar to NGC 5128. The linear dimensions of this band in both galaxies are almost the same. Latest radio astronomical observations undoubtedly suggest that Cygnus A and Centaurus A give rise to radio emission of the same type. One would, therefore, expect that the galaxies Cygnus A and NGC 5128 are, in fact, related objects. Moreover, NGC 5128 can in no way be considered as a system of colliding galaxies. It is thus concluded that the Cygnus A source is either a peculiar galaxy of high luminosity and large mass with a wide dark band across its middle or, more probably, a multiple system with closely located nuclei. Using the theory of the decrease of brightness of expanding sources of synchrotron emission, it is shown that the extended source Centaurus A is a source similar to Cygnus A but in a later stage of evolution. Hercules A and Hydra A belong to the same type of source. Using the theory developed by the present author in Ref.15, it is estimated that the age of the Cygnus A source is about 10^7 years and the age of Centaurus A is between 10^8 and 3×10^8 years. The final conclusion is that all the radio galaxies are objects similar to Cygnus A and

Card 4/6

87243

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E032/E514

Radio Galaxies

Centaurus A but at different evolutionary stages. Using Cygnus A, Centaurus A and Virgo A as examples, it is shown that magnetized gas clouds (plasmoids) containing a large number of relativistic particles are ejected from the nuclei of these galaxies. The directions of ejection are, according to comparisons with observational data, close to the axes of rotation of these galaxies. These ejected clouds form extended sources of radio emission and are located symmetrically with respect to the parent galaxies. They expand with velocities of the order of 10^8 cm/sec and show a considerable decrease in their radio luminosity, and particularly brightness, in about $10^7 - 10^8$ years. Supernovae are the most probable sources of relativistic particles in the central regions of galaxies. Since heavy elements are formed during such explosions, the total number of relativistic particles forming in a radio galaxy during its evolution can be estimated empirically from the observed chemical composition. It has been shown that at the early stage of evolution every galaxy (including our own) has all the characteristics of a radio galaxy. In radio galaxies of the Cygnus A and Centaurus A type, the process of nucleogenesis, X

Card 5/6

5/243
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E032/E514

Radio Galaxies

which is accompanied by the ejection of an enormous number of relativistic particles, was more rapid than in our own galaxy by several orders of magnitude and this is explained by their large mass. In the final section the density of relativistic particles in the various regions under consideration is estimated and it is concluded that the process of formation of galaxies from a diffuse gaseous medium is still continuing and is a permanent phenomenon in metagalaxy. There are 36 references: 12 Soviet and 24 non-Soviet. J

ASSOCIATION: Gos. astronomicheskiy in-t imeni P.K. Shternberga
(State Astronomical Institute imeni P.K. Shternberg)

SUBMITTED: June 8, 1960

Card 6/6

SHKLOVSKIY, I.S., professor

Is it possible to communicate with intelligent beings of
other planets? Priroda 49 no.7:21-30 Jl '60.
(MIRA 13:7)

(Life on other planets)

81700
S/020/60/132/05/25/069
B014/B125

3.9000

AUTHORS: Gringauz, K. I., Kurt, V. G., Moroz, V. I.,
Shklovskiy, I. S.

TITLE: An Ionized Gas and ²Fast Electrons in the Vicinity of the
Earth and in Interplanetary Space

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 5,
pp. 1062 - 1065

TEXT: As the results of the second Soviet cosmic rocket indicate, the
first half of its orbit can be divided into four parts. The first ex-
tends to a distance from the earth $R = 22,000$ km. Significant positive
collector currents occur at all traps with negative or zero potentials.
In the second part, from 22,000 km to 50,000 km, the collector currents
varied between zero and several negative values. In the range from
50,000 km to 70,000 km (third part) negative currents occur in all
traps. With R greater than 70,000 km (fourth part) the currents vary in
all traps between 0 and $5 - 6 \cdot 10^{-10}$ a. These results agree in all three

Card 1/3

An Ionized Gas and Fast Electrons in the
Vicinity of the Earth and in Interplanetary
Space

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B014/B125

Soviet cosmic rockets. Further the estimation of the ion concentration was dealt with according to the data and it was determined that one must know the potential of the receiver in this connection. This potential depends on the fluxes of high-energy electrons (> 200 ev) and the most important information on this was obtained with the help of the measurements of the three-electrode traps. From an extensive investigation it is seen that in the first part of the orbit the flux of electrons with an energy higher than 200 ev does not exceed $2 \cdot 10^7 \text{ cm}^{-2} \cdot \text{sec}^{-1}$.

Only electrons with more than 200 ev (flux $1 \cdot 10^8 - 2 \cdot 10^8 \text{ cm}^{-2} \cdot \text{sec}^{-1}$) were found in the third part of the orbit. The existence of a third radiation belt, the lower boundary of which was at 30,000 km on February 2, 1959, follows from the characteristics of the results discussed here. Further, the influence of the photoelectric effect induced by ultraviolet solar radiation on the potential of the receiver is investigated. As calculations show, the potential differs from zero only by several volts when with n_1 representing the ion concentration in

Card 2/3

An Ionized Gas and Fast Electrons in the
Vicinity of the Earth and in Interplanetary
Space

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B014/B125

the plasma, $n_1 \geq 10 \text{ cm}^{-3}$ and temperature is not too high ($T = 10^4 \text{ }^\circ\text{K}$).

Reference is made to the existence of the plasma of the earth corona, which is found at about $R = 15,000 \text{ km}$. Calculated and experimentally determined concentration distributions of the ions as dependent on R are graphically represented in Fig. 3. A steep drop of the ion concentration begins at $15,000 \text{ km}$; this fact requires more exact study. Only an upper limit of $30\text{--}60 \text{ cm}^{-3}$ can be given for the ion concentration in the range of R greater than $22,000 \text{ km}$. The authors mention among others V. G. Fesenkov (Ref. 10). There are 3 figures and 12 references: 7 Soviet, 3 American, 1 English, and 1 German.

PRESENTED: March 1, 1960, by A. L. Mints, Academician

SUBMITTED: February 24, 1960

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Card 3/3

40443

3.5131
3.2420

P/048/61/000/003/002/004
I004/I204

AUTHORS Gringauz, K. I., Kurt, W. G., Moroz, W. I., Szkolowski, I. S.
TITLE Ionized gas and fast electrons in the vicinity of Earth and in interplanetary space
PERIODICAL Astronautika no. 3, 1961, 8—10

TEXT The purpose of this work is to analyze the distribution and nature of radiation in the space surrounding earth with regard to the resultant danger to manned space flights. Data gathered by the second Soviet cosmic rocket show that four different concentrations of ions can be distinguished along the first half of its trajectory. In the first portion, extending up to $R = 22,000$ km (R — the distance from the surface of earth), all counters with negative or zero potential registered high positive collector currents while in counters with $+15$ v charge relative to the housing, the currents were either small and negative or zero. In the second portion, between 22,000 and 50,000 km, the collector currents varied between zero and negative values. The third portion, 50,000 — 70,000 km, showed negative current in all traps. Above 70,000 km current values were as in portion 2. The current variations in the $+15$ V trap indicate that the electron flux in the outer radiation belt is below $2 \cdot 10^7 \text{ cm}^{-2} \text{ sec}^{-1}$. This contradicts the established idea that there exist large electron streams of $E \approx 20$ to 30 kev in the maximum region of the outer radiation belt. It is assumed that the density of the kinetic energy of the electrons there, is by several orders of magnitude smaller than the energy density of the magnetic field of earth. There are 3 figures.

Card 1/1

25989

S/560/61/000/006/007/010

E032/E114

9,9100

AUTHORS: Gringauz, K.I., Kurt, V.G., Moroz, V.I., and Shklovskiy, I.S.

TITLE: Ionized gas and fast electrons in the earth's neighbourhood and in planetary space

PERIODICAL: Akademiya nauk SSSR. Iskusstvennyye sputniki Zemli. No. 6. Moscow, 1961. pp. 108-112

TEXT: This paper was first published in Doklady AN SSSR, Vol.132, page 1062, 1960.

K.I. Gringauz, V.V. Bezrukikh, V.D. Ozerov and R.E. Rybchinskiy (present issue, page 101 - Ref.1) showed that the first half of the trajectory of the second Soviet space rocket can be divided into four parts, namely: 1) distances up to $R = 22000$ km (R is the distance from the earth's surface) where all the traps with negative or zero potential recorded appreciable collector currents, while the trap whose potential relative to the body was $+ 15$ V showed either very small negative currents or no current at all; 2) distances in the range $22000-50000$ km, where collector currents in all the traps varied between zero and some negative values

Card 1/6

25989

S/560/61/000/006/007/010
E032/E114

Ionized gas and fast electrons

($I_c < 6 \times 10^{-10}$ amp); 3) distances in the range 50000-70000 km where negative currents were recorded in all the traps and the absolute maximum and minimum currents were 10^{-9} and 3×10^{-10} amp respectively; 4) distances greater than 70000 km where currents in all the traps oscillated between zero and approximately $(5-6) \times 10^{-10}$ amp, which apparently represents the maximum photoelectric current due to the inner grid which is intercepted by the collector. The overall trend of the results was found to be the same for all the three flights of Soviet space rockets. Analysis of all the results has led the present authors to the scheme indicated in Fig.2 in which 1 is the 'inner' belt, 2 is the 'outer' belt, 3 is the third belt (now postulated), and 4 is the geomagnetic equator. In the region of between 50000 and 70000 km the negative currents of all the traps, which reached 10^{-9} amp, can only be explained by electrons with energies in excess of 200 eV and $N_e \sim 10^8 - 2 \times 10^8 \text{ cm}^{-2}\text{sec}^{-1}$. The third belt therefore consists of relatively low energy electrons which explains why previous experiments did not detect its presence. Experiments carried out from the third Soviet artificial satellite (Ref.8: V.I. Krasovskiy, I.S. Shlkovskiy, Yu.I. Gal'perin, Ye.M. Svetlitskiy, Dokl. AN SSSR, V.127, 78, 1959) Card 2/ 6

25989

Ionized gas and fast electrons

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EO32/E114

at $R = 1800$ km and above moderate geomagnetic altitudes indicate the presence of electrons with about 10 keV (up to $3 \times 10^8 \text{ cm}^{-2} \text{ sec}^{-1}$). This may mean that in the region of the radiation belts the concentration of soft electrons is a minimum. However, the experiment reported in Ref.8 was not simultaneous with that described in the present paper. The readings of the trap with zero potential over the first section of the trajectory can be used to estimate the plasma ion concentration. Fig.3 shows the plasma ion concentration as a function of the distance from the earth's surface [1 - theoretical distribution with $T = 1.8 \times 10^3$; 2, 3, 4 - experimental results with $T = 1800, 1000$ and 5000° respectively; points a and b represent measurements at 470 and 800 km respectively (third artificial earth satellite)]. It follows from Fig.3 that the plasma is not the interplanetary ionized gas, and in fact it is an extended shell which is a part of the ionized component of the outermost part of the earth's atmosphere, i.e. that so called geocorona. There are 3 figures and 12 references; 7 Soviet and 5 non-Soviet. The four most recent English language references read as follows:
Card 3/6

Ionized gas and fast electrons 25989
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E032/E114

Ref.3: J.A. Van Allen, L.A. Frank. Nature, V.183, 430, 1959.

Ref.5: J.A. Van Allen, L.A. Frank. Nature, V.184, 219, 1959.

Ref.6: J.A. Van Allen, C.E. McIlwain, G.H. Ludwig.

J. Geoph. Res., V.64, 271, 1959.

Ref.11: H.C. van de Hulst. Light Scattering by Small Particles.
London, 1957.

Card 4/6

25990

S/560/61/000/006/008/010

EO32/E314

9,9100

AUTHORS: Krasovskiy, V.I., Shklovskiy, I.S., Gal'perin, Yu.I.,
Svetlitskiy, Ye.M., Kushnir, Yu.M. and
Bordovskiy, G.A.

TITLE: Discovery of Approximately 10 keV Electrons in the
Upper Atmosphere

PERIODICAL: Akademiya SSSR. Iskusstvennyye sputniki Zemli.
No. 6. Moscow, 1961, pp. 113 - 126

TEXT: Prior to experiments carried out with the aid of
artificial Earth satellites, it was assumed that the natural
glow, heating, and ionization of the upper atmosphere was largely
due to hard electromagnetic radiation of solar origin. It was
considered that corpuscular radiation (protons, α -particles and
electrons) could only penetrate the atmosphere in the polar
regions and thereby give rise to geomagnetic disturbances and
aurorae. It was found that aurorae were frequently initiated
by protons with a considerable velocity spread. However, in
many cases, hydrogen-emission was not observed and the appearance
of aurorae was provisionally associated with electrons having
Card 1/7

25990

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Discovery of

energies up to a few hundreds or thousands of eV. An attempt was then made by Krasovskiy et al (Ref. 3 - UFN, 64, 425, 1958) to detect these electrons from the third Soviet artificial Earth satellite. The apparatus employed consisted of two very thin phosphors covered by aluminium foils. The scintillations were recorded by photomultipliers and the amplified photo-multiplier signal was stored and later telemetered to Earth. Owing to the presence of the aluminium foils (which were of differing thicknesses) it was possible to estimate both the intensity and the energy of the electrons which were most effective in exciting the phosphors. A particular feature of this apparatus was that it was sensitive only to electrons and did not respond to protons and photons of comparable energy. The apparatus indicated the presence of large electron currents at altitudes up to 900 km in the region of the southern part of the Pacific Ocean, the energy of these electrons being of the order of 10 keV. These currents were often so large that the apparatus gave off-scale readings since such high currents were not expected. In the case of these off-scale readings the energy

Card 2/7

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E032/E314

Discovery of

flux exceeded $100 \text{ erg cm}^{-2} \text{ sec}^{-1}$ at altitudes up to 1 900 km from the Earth's surface. Fig. 2 shows the calibration curves for the two detectors employed in this experiment. The dashed lines correspond to aluminium foil of $0.8 \times 10^{-3} \text{ g/cm}^2$ and the continuous lines correspond to aluminium foil of $0.4 \times 10^{-3} \text{ g/cm}^2$. The numbers on these lines indicate the energy of the electrons in keV. These calibration curves were obtained in laboratory experiments using parallel beams of mono-energetic electrons. The current density of mono-chromatic electrons (A/cm^2) is plotted along the vertical axis and the telemetric channel number, which is proportional to the logarithm of the photomultiplier current, along the horizontal axis. Fig. 3 shows the difference ΔK between the logarithmic-scale divisions of the two detectors as a function of the energy of the electrons used in the calibration. The ratio of the photo-currents of the two detectors depends on the energy of the electrons or, more precisely, on the form of the energy spectrum. This relation was determined in Card 3/7

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E032/E314

Discovery of

preliminary laboratory experiments with mono-energetic electrons. The form of the energy spectrum recorded by the satellite is unknown and comparison of the readings produced by the two detectors can only be used to estimate an equivalent energy. This equivalent energy E_{equiv} is defined as the energy of a monochromatic beam which gives the same photo-current ratio for the two detectors as the observed value. Proceeding along these lines one can also define an equivalent current and an equivalent energy flux. It can easily be shown that these equivalent quantities give, in fact, the lower limits of the measured quantities. Consideration of the telemetric records, a number of which are reproduced in the present paper, showed that the most frequently recorded energies occurred in the neighbourhood of 14 keV. Since the sensitivity of the apparatus is considerably higher for high-energy electrons, it follows that in the case of non-monochromatic electrons the maximum flux corresponds to an energy below 14 keV. This maximum can be determined if some energy-distribution function

Card 4/7

25990

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E032/E314

Discovery of

is assumed. It is estimated that the energy flux associated with these currents, which may reach the lower layers of the atmosphere, is at least $1 \text{ erg cm}^{-2} \text{ sec}^{-1}$. The discovery of large currents of 10 keV electrons is of particular importance to the understanding of many geophysical phenomena. For example, it is interesting to note that appreciable intensities of such electrons first appear at the geomagnetic latitude at which increased ionization was previously recorded in the F-layer and which could not be explained by hard electromagnetic radiation of solar origin. The existence of these electron currents may lead to the explanation of ionization irregularities in the upper atmosphere. Acknowledgments are made to S.Sh. Dolginov, V.V. Beletskiy and Yu.V. Zonov for determining the orientation of the apparatus relative to the magnetic field. There are 11 figures and 15 references: 12 Soviet and 3 non-Soviet.

SUBMITTED: December 9, 1959

Card 5/7

SHILOVSKIY, I.S.; FIKEL'TER, J.B.

On P. Foyle's article "Problem of radio sources." *Introd.*
Sov. 38 no. 1:196-198 Jan '61. (*ibid* 14:2)
(Radio astronomy)

3.2430 (1559, 1482)

29302
S/053/61/075/002/007/007
B125/B102

AUTHOR: Shklovskiy, I. S.

TITLE: Ultraviolet radiation and soft X-radiation of the Sun

PERIODICAL: Uspekhi fizicheskikh nauk, v. 75, no. 2, 1961, 351 - 388

TEXT: The results of ionospheric observations of ultraviolet radiation of the Sun are compiled in Table 1. Ya. P. Al'pert (ZhETF 18, 995 (1948)) found $Q_{\text{observed}}^{\text{Allen}} = 4 \cdot 10^{10} \text{ cm}^2 \text{ sec}^{-1}$ for the F_2 layer. According to observation data, there is an inversion of the kinetic temperature in the upper layers of the solar atmosphere (upper chromosphere and corona). The solar corona, regarded as a very hot plasma, is a source of ultraviolet radiation and soft X-radiation. On the periphery of the solar disc, the brightness of ultraviolet light must vary discontinuously as the corona is transparent to the proper ultraviolet radiation, and the Sun shields off a considerable part of this radiation. The far ultraviolet solar radiation originates almost entirely from the corona. The corona is not transparent to the allowed ultraviolet and X-ray lines originating in it. Above the active

Card 1/4

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B125/B102

Ultraviolet radiation...

radiation; the corona is especially thick and there are probably more or less bright "spots" of ultraviolet and soft X-radiation. The second part of the present paper presents a review of the principal results of observations of the ultraviolet and soft X-radiation of the Sun by means of rockets and artificial satellites. A. V. Yakovleva et al. (Izv. AN SSSR, ser. geofiz. 9, 1099 (1958)), G. S. Ivanov-Kholodnyy, G. M. Nikol'skiy (Astron. zh. 38, 45 (1961)) are mentioned. In 1961 it has been found that the upper chromosphere and the intermediate region between corona and chromosphere make the greatest contribution to the ultraviolet region $912 < \lambda < 1000 \text{ \AA}$. A considerable temperature gradient seems to exist between the upper chromosphere and the inner corona. The fluxes of very hard X-ray-quanta of dozens and hundreds of kv are a new, very interesting phenomenon, which can last for some minutes. The energy flux of photons of $>20 \text{ kev}$ amounts to $\sim 5 \cdot 10^{-6} \text{ erg/cm}^2$. These photons penetrate into the Earth's atmosphere down to an altitude of $\sim 45 \text{ km}$. The third part deals with the influence of hard solar radiation upon the ionization of the Earth's atmosphere. Only the most general considerations concerning the origin of the various ionospheric layers are taken into account. The most

Card 2/4

X

Ultraviolet radiation...

29302

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B125/B102

intense emission beyond the edge of the Lyman Series, is concentrated a) immediately near the edge in the region $912 > \lambda > 850 \text{ \AA}$; (This radiation is caused by the upper layers of chromospheric floccules.) b) in the radiation beyond the edge of the ionized helium series; (This radiation originates from the intermediate radiation of the solar atmosphere.) c) in many other bright lines, the brightest of which are due to He I, O II, O III, O IV, O I, N IV, and C III. Also these lines originate from the intermediate region. In the formation of the ionospheric F layer, hard corona radiation is of minor importance. The E layer is due to the photoionization of oxygen and nitrogen by the hard corona radiation $\lambda < 75 \text{ \AA}$. Observations during total solar eclipses clearly show that the hard photon radiation that ionizes the E layer originates from the corona. Experimental and theoretical results are in good agreement. The results of rocket astronomy and of the theory of the solar corona and chromosphere permit an explanation of all the phenomena observed in the Earth's atmosphere. There are 23 figures, 3 tables, and 52 references: 12 Soviet and 40 non-Soviet. The three most recent references to English-language publications read as follows: G. Elwert, J. Geophys. Res. 66, 391 (1961); Sky and Telescope 20, no. 3, 143 (1960); A. S. X

Card 3/4

SUKHOVSKIY, Iosif Samuilovich; MAZIN, I.P., red. izd-va; MAKUNI, Ye.V.,
takhn. red.

[Universe, life, reason]Vselennaia, zhizn', razum. Moskva,
Izd-vo Akad. nauk SSSR, 1962. 238 p. (MIRA 16:2)
(Plurality of worlds)

SHKLOVSKIY, Iosif Samuilovich; RAKHLIN, I.Ye., red.; BRUDNO, K.F.,
tekh. red.

[Physics of the solar corona] Fizika solnechnoi korony. Izd.2.,
perer. i dop. Moskva, Gos. izd-vo fiziko-matem. lit-ry,
1962. 516 p. (MIRA 15:4)
(Sun--Corona)

S/033/62/039/002/002/014
E032/E314

AUTHOR: Shklovskiy, I.S.

TITLE: Supernovae explosions and the interstellar medium

PERIODICAL: Astronomicheskiy zhurnal, v. 39, no. 2, 1962,
209 - 215

TEXT: It is pointed out that the kinetic energy of the envelopes of supernovae is exceptionally high. In the case of type II supernovae the mass of the envelopes may reach several solar masses and the velocity is of the order of $5 \times 10^8 - 7 \times 10^8$ cm/sec. The kinetic energy of the ejected envelopes may reach up to 10^{52} erg. The envelope material is eventually slowed down by the surrounding medium and the kinetic energy of the envelope and the gas heated by it continuously decreases. The problem arises therefore as to what happens to this energy. It is stated that this problem has not as yet been analyzed. A review of available information leads the present author to the conclusion that, in the case of "young" supernovae, this energy is not transformed into radiation.
Card 1/2

Supernovae explosions

S/055/62/039/002/002/014
E052/E514

The author argues that a supernova explosion in an interstellar medium may be looked upon as a strong adiabatic explosion in a medium with constant specific heat. Use is made of the self-simulating solution for a strong explosion to investigate the disturbance of the interstellar medium due to the explosion. This is used to derive a new formula for the deceleration time of expanding nebulae, which are the remnants of supernovae explosions. The paper is concluded with a brief discussion of the astrophysical consequences of this new theory of disturbances induced in the interstellar medium by supernovae explosions.

ASSOCIATION: Gos. astronomicheskii in-t im. P.K. Shternberga
(State Astronomical Institute im. P.K.Shternberg)

SUBMITTED: May 30, 1961

Card 2/2

SHKLOVSKIY, I.S.

Nature of radio galaxies. Astron.zhur. 39 no.4:591-607 J1-Ag
'62. (MIRA 15:7)

1. Gosudarstvennyy astronomicheskiy institut imeni P.K.Shternberga.
(Radio astronomy) (Galaxies)

SHKLOVSKIY, I.S.

Radiogalaxies. Usp. fiz. nauk 77 no.1:3-60 My '62.
(Radio astronomy)

(MIRA 15:6)

SHKLOVSKIY, I.S.

Distance to radio galaxy 3C-286. Astron. tsir. no. 250:6-7 J1 '63.
(MIRA 17:5)

1. Gosudarstvennyy astronomicheskiy institut imeni Shternberga.

SHKLOVSKIY, I.S.

Remarks on the nature of jets of radio galaxies. *Astron. zhur.* 40
no. 6: 972-981 N-D '63. (MIRA 16:12)

1. Gosudarstvennyy astronomicheskii institut im. P.K. Shklovskogo.

SHKLOVSKIY, I.S., prof., astrofizik, radioastronom

Is life possible on Jupiter? Priroda 52 no.2:111 '63.

(MIRA 16:2)

(Jupiter (Planet))

(Life on other planets)

ACCESSION NR: AP4025903

S/0030/64/000/002/0022/0028

AUTHORS: Shklovskiy, I. S. (Doctor of physico-mathematical sciences)

TITLE: News about radio galaxies

SOURCE: AN SSSR. Vestnik, no. 2, 1964, 22-28

TOPIC TAGS: radio galaxy, astrophysics, radio wave, optical radiation, gravitational collapse, gravitational radius

ABSTRACT: The origin and nature of radio galaxies are considered to be the most important problems of astrophysics of the past decade. The fundamental problem is the source of the tremendous power that originates in the galactic nuclei from time to time. It has been discovered that some extragalactic sources of radio waves may be identified with star-like objects of tremendous luminosity--radio stars. These have variable brightness and linear dimensions of the optical-radiation source less than 10^{16} cm. On the explosion of a super-star some part of the mass apparently separates off and begins to expand at a rate on the order of 1000 km/sec. Within the part of the super-star that exceeds the mass of the ejected envelope, catastrophic compression begins. During this collapse, the central part

Card 1/2

ACCESSION NR: AP4025903

APPROVED FOR RELEASE: 08/23/2000

CIA-RDP86-00513R001549620018-5

approximates in size the so-called gravitational radius, and on the surface of this sphere the second cosmic velocity is equal to the velocity of light. The gravitational radius is proportional to the mass of the compressed body. This would be about 3 km for a mass equal to that of the sun, and for a mass $3 \cdot 10^7$ times that of the sun, the radius would be about 10^{13} cm. Such a mass could not be observed, but it would exert a tremendous gravitational force, and the density near the core might be considerable. Orig. art. has: 4 figures.

ASSOCIATION: none

SUBMITTED: 00

DATE ACQ: 08Apr64

ENCL: 00

SUB CODE: AA

NO REF SOV: 001

OTHER: 000

Card 2/2

SHKLOVSKIY, I.S.

Nature of solar X-ray emission. Astron. zhur. 41 no.4:676-683
Jl-Ag '64 (MIRA 17:8)

1. Gosudarstvennyy astronomicheskiy institut im.

ACCESSION NR: AP4034535

S/0020/64/155/005/1039/1041

AUTHOR: Shklovskiy, I. S.; Kardashev, N. S.

TITLE: Gravitational waves and "superstars"

SOURCE: AN SSSR. Doklady*, v. 155, no. 5, 1964, 1039-1041

TOPIC TAGS: superstar, collapsing star, gravitational collapse, gravitational wave, general relativity theory, cosmic ray, radio star, energy transformation, gravitational energy

ABSTRACT: Starlike objects, identified with point radio sources, have been recently discovered. They are believed to have masses many million times the sun mass and to be of less than 10^{16} cm in diameter. The authors discuss some results of the general theory of relativity that might be applicable to this superstar and to their gravitational collapse. The intensive radiation of gravitational waves must greatly affect the energy balance. By using a simple model for the collapsing star (a rod) and by considering the gradual increase of rotation due to conservation of angular momentum, a gravitational emission is computed to be in the order of 10^{54} erg/sec. A similar result is obtained for

Card 1/2

SHKOVSKIY, I. A.

Physical conditions in the glove: envelope of 3G-273. Astron.zhur.
41 no.5:801-806 5-6 64.

Gosudarstvennyy astronomsicheskiy i fizichesk. nauch. tsentr im. P.F. Leschenko, 01.01.17.01

L 64067-65 FSS-2/EWT(1)/EEC(m)/FS(v)-3/ENG(v)/FCC/EEC-4/EWA(h) TT/GW

UR/0384/65/000/003/0002/0007

ACCESSION NR: AP5018434

AUTHOR: Shklovskiy, I. S. (Professor)

TITLE: X-ray astronomy

SOURCE: Zemlya i Vselennaya, no. 3, 1965, 2-7

TOPIC TAGS: spacecraft instrumentation, solar x radiation, x radiation

ABSTRACT: The study of the ultraviolet and x-ray spectra of the Sun and stars yields valuable information concerning their chemical composition and the physical conditions of their surface layers. The only way of investigating the radiation of celestial bodies in the shortwave region of the spectrum is to lift special instruments to very high altitudes, i. e., hundreds of kilometers. Direct access to the upper atmosphere for scientific purposes, which has only come about in the past two decades, has laid the foundations for rocket and satellite astronomy. That branch of rocket and satellite astronomy dealing with stellar x radiation is called x-ray astronomy.

Card 1/4

L 64067-65

ACCESSION NR: AP5018434

Since x-rays are neither refracted nor reflected by a mirror, such astronomical instruments as the telescope and spectrograph have been replaced in x-ray astronomy by supersensitive counters. These counters are coated with special substances which absorb low-energy x-ray quanta and allow the fairly high energy quanta to pass through. The resolution of today's x-ray astronomy, however, is very low.

Most of the Sun's x radiation originates in the corona and in certain active regions of the chromosphere. This has been conclusively demonstrated by special studies carried out during a solar eclipse. In these studies, rocket-borne instruments have continuously registered the solar x-ray flux and transmitted the readings back to Earth by telemetry. Since the readings did not drop to zero it was inferred that x radiation originates in the solar atmosphere beyond the visible surface of the Sun, i. e., during an eclipse.

In 1963 a group of American scientists associated with the Naval Research Laboratory, headed by Professor H. Friedman, discovered two x radiation

Card 2/4

L 64067-55

ACCESSION NR: AP5018434

sources: one in Taurus constellation of the Crab nebula and another, eight times as powerful, in the Scorpio constellation. Some ten years ago, Shklovskiy pointed to the common, although somewhat unusual, property of the optical and radio-frequency radiation from the Crab nebula. Electromagnetic waves are emitted by so-called relativistic electrons (i. e., electrons whose energy considerably exceeds mc^2 —the energy of a quiescent electron) moving in the magnetic field which permeates this nebula (synchrotron radiation). Whereas radio waves are emitted by relativistic electrons in the energy range of 10^8 — 10^9 ev, the optical radiation of the Crab nebula is produced by fewer electrons of a higher energy (about $3 \cdot 10^{11}$ ev).

Particle acceleration by electromagnetic mechanisms within our galaxy presents one of the major problems in astrophysics at the present time. The most recent detection by Friedman's group of ten more x-radiation sources near the galactic equator has led to the surmise that there are about

Card 3/4

L 64067-55

ACCESSION NR: AP5018434

100 x radiation sources of this type in our galaxy. Knowing the approximate distance to these strange objects and the amount of x radiation they are sending to Earth, their total intensity can be estimated at several thousand times that of solar radiation on all wavelengths. Shklovskiy believes that x radiation has its origin in the neutron stars. These must be the end product of stellar evolution, and their surfaces cool off at a fast rate (within a few hundred years). Considering the short life-span of a neutron star at a temperature of about 10 million degrees, the conclusion can be made that a new neutron star appears and soon disappears at least once every few years within our stellar system. Several billion neutron stars are thought to have been born during the existence of our galaxy. Orig. art. has: 3 figures.

ASSOCIATION: none

SUBMITTED: 000

ENCL: 00

SUB CODE: AA

NR REF SOV: 000

OTHER: 000

ATD Press: 4065-F

MRC
Card 4/4

L 5170-66 EWT(1)/FS(7)-3 GS/GW

ACC NR: AT5024308

SOURCE CODE: UR/0000/65/000/000/0015/0034

AUTHOR: Shklovskiy, I. S.

57

47

8+1

ORG: State Astronomical Institute im. P. K. Shternberg, MGU, Moscow (Gosudarstvennyy astronomicheskiy institut, MGU)

TITLE: The number of inhabited worlds and the problem of establishing contacts among them

SOURCE: Vsesoyuznoye soveshchaniye, posvyashchennoye probleme vnezemnykh tsivilizatsiy. 1st Byurakan, 1964. Vnezemnyye tsivilizatsii (Extraterrestrial civilizations); trudy soveshchaniya. Yerevan, Izd-vo AN ArmSSR, 1965, 15-34

TOPIC TAGS: astronomy, galactic radiation, galactic structure, astrophysics, radio astronomy, planet, planetary environment, planetary life

ABSTRACT: The author discusses the likelihood of the existence of inhabited planets and the problem of establishing contact with civilizations on other planets. Mention is made of some concrete achievements of science in the serious

Card 1/2

09010739

L 5170-66

ACC NR: AT5024308

10

evaluation of likelihood of extraterrestrial life. Recent research indicates a large scattering of planetary systems in our galaxy, and reference is made to the discoveries of Van de Camp in the field of photographic astrometry. Further information on the nature of life, its origins and development, comes from the study of molecular biology, biophysics, and biochemistry. A third important area of research is the field of radio astronomy. Of special importance for establishing interplanetary communication is the development of quantum amplifiers of radiation (masers) and of antenna devices with large equivalent surfaces. Developments in the field of cybernetics are important for complex analyses, for automata problems, and for the creation of quasi-rational machine forms of "life". The question of existence of higher forms of life on other planets is approached from the consideration of what is necessary in a world to generate rational life. The author takes the viewpoint that, in spite of a possibly long and continuous evolution, the chances of existence of a rational form are still small for a single planet. Several philosophical and technological aspects of interstellar communication by travel and by electromagnetic radiation are discussed. The comments and recommendations of G. A. Gurzadyan,⁵ Ya. B. Zel'dovich,⁵ V. A. Kotelnikov,⁵ B. V. Kukarkin,⁵ and D. Ya. Martynov,⁵ concerning the content of the article are given. Orig. art. has: 1 equation and 1 figure.

SUB CODE: AA/ SUBM DATE: 26May65/

Card 2/2 *md*

SHALOMKIV, I.S.

Possible secular variation of the flux and spectrum of radio
emission from the source 1934-63. Astron. zhur. 42 no.1:30-32
Ja-F '65. (MIRA 18:2)

i. Gosudatstvennyy astronomicheskii institut im. P.K. Shternberga.

SHKLOVSKIY, I.S.

Supernova of 1054 - a double star? Dokl. AN SSSR 160 no.1:54-56
Ja '65. (MIRA 18:2)

1. Gosudarstvennyy astronomicheskiy institut im. P.K. Shternberga.
Submitted August 5, 1964.

... 1965. (MIRA 18:10)

L 14111-66 EWT(1) GW

ACC NR: AR5018941

SOURCE CODE: UR/0269/65/000/007/0039/0039

AUTHOR: Shklovskiy, I.S.

ORG: none

TITLE: The reason for the absence of flares of the Supernova II type in the irregular galaxies

SOURCE: Ref. zh. Astronomiya. Otdel'nyy vypusk, Abs. 7.51.333

REF SOURCE: Astron. tsirkulyar, no. 312, yanv. 12, 1965, 4-6

TOPIC TAGS: galaxy, galactic structure, galactic radiation, hot star, galaxy spectrum

TRANSLATION: Possible reasons are discussed for the absence of flares of Supernova II type in irregular galaxies. The hypothesis is offered that a reason may be found in the great variations in the velocity of axial rotation of the stars of early spectral classes (potentials of Supernova II type) and in the irregular and spiral galaxies. In irregular galaxies, due to conditions causing the formation of massive hot stars out of the interstellar medium, the velocity of their rotation is possibly too low. This may perhaps explain the abnormally high luminosity of Supernova I type in irregular galaxies. A verification of this hypothesis, with the help of a spectroscopic study of Magellan Clouds, is desirable. M. Frolov.

SUB CODE: 03

Card 1/1

UDC: 523.855

2

SHKLOVSKIY, I.S.

Comments on the spectrum of synchrotron radiation of the
Crab nebula. Astron. zhur. 43 no. 1:10-12 Ja -F '66
(MIRA 19:2)

1. Gosudarstvennyy astronomicheskiy institut imeni
P.K. Shternberga. Submitted October 20, 1965.

L 02450-67 MWT(1) 34

ACC NR: AP6028789

SOURCE CODE: UR/0033/66/043/004/0747/0753

AUTHOR: Shklovskiy, I. S.ORG: State Astronomical Institute im. P. K. Shternberg (Gos. astronomicheskii in-t)TITLE: Comments on the remnants of supernovae outburstsSOURCE: Astronomicheskii zhurnal, v. 43, no. 4, 1966, 747-753

TOPIC TAGS: supernova, radio astronomy, galaxy

ABSTRACT: As a result of the pressure of very hot plasma, it is argued that the coronal line emission, particularly at $\lambda = 5303$ (Fe XIV), should be observable in some "old" remnants of type-II supernovae outbursts. Appreciable fluxes of soft x-ray quanta can be expected from younger remnants of type II supernovae outbursts (particularly from Cas-A). An independent determination is made of the distance to the LMC by the radioastronomical method based on an analysis of observed sources -- remnants of type-II supernovae. The frequency of such outbursts in the LMC is estimated to be about one every 10,000 yr. The theoretical luminosity function of remnants of type-II supernovae outbursts of a given galaxy is determined. Orig. art. has: 12 formulas.

SUB CODE: 03/ SUBM DATE: 07Feb66/ ORIG REF: 005/ OTH REF: 004

Card 1/1 *gd*

UDC: 523.841.1

REF ID: A66034893
SOURCE CODE: UR/0269/66/000/008/0045/0045

AUTHOR: Shklovskiy, I. S.

TITLE: Remanent radiation of the universe and population of the rotational levels of interstellar molecules

SOURCE: Ref. zh. Astronomiya, Abs. 8.51.376

REF SOURCE: Astron. tsirkulyar, no. 364, marta 29, 1966, 1-3

TOPIC TAGS: molecule, optic thickness, stellar population, intergalactic space, interstellar space, remanent radio emission

ABSTRACT: The influence of remanent radio emission on the condition of matter in intergalactic and interstellar space is analyzed. It is pointed out that the population of low rotational levels of interstellar molecules must be regulated by remanent Planckian radiation at a temperature of $T_p = 3$ degrees K. The probability of radiation absorption by the CN molecule and the optic thickness in the line $\lambda = 0.26$ cm were calculated. Theoretical results agree well with results of the Adams definition ("Astroph. J", 1941, 93, 11) of the excitation temperature of CN $T \sim 2.3$ degrees K of the rotational line. Until lately, the Adams observations

UDC: 523.164.4

Card 1/2

ACC NR: AR6035288

SOURCE CODE: UR/0269/66/000/009/0033/0033

AUTHOR: Shklovskiy, I. S.

TITLE: Possibility of determining the content of relativistic protons in some cosmic sources of synchrotron radiation

SOURCE: Ref. zh. Astronomiya, Abs. 9.51.292

REF SOURCE: Astron. tsirkulyar, no. 364, marta 29, 1966, 4-7

TOPIC TAGS: proton, x ray emission, electron interaction, synchrotron, proton

ABSTRACT: The author investigated the possibility of generating hard x-ray emission as a result of interaction of relativistic electron in sources of synchrotron radiation, with photons of the relict level. The detection of hard x-ray emission in an interval of 1.7—8.7 A (generated by relativistic electrons with an energy of 10^8 — 10^9 ev) would allow (with some additional suppositions) the determination of the relativistic proton content of a number of sources. The Centaurus A radiation source is suggested as most convenient for such an experiment.

Bibliography of 7 titles. G. Sholomitskiy. [Translation of abstract] [NT]

SUB CODE: 03/

Card 1/1

UDC: 523.165

ACC NR: AP7008801

SOURCE CODE: UR/0033/67/044/001/0058/0066

AUTHOR: Shklovskiy, I. S.

ORG: State Astronomical Inst. im. P. K. Shternberg (Gosudarstvennyy astronomicheskiy institut)

TITLE: The nature of the x-ray radiation of Galaxies

SOURCE: Astronomicheskiy zhurnal, v. 44, no. 1, 1967, 58-66

TOPIC TAGS: galaxy, x ray emission, galactic radiation, thermal radiation, cosmic radio source, dense plasma

ABSTRACT: The possible mechanism of x-ray emission of the radio galaxies Cyg A and Vir A is analyzed. For this purpose, the physical conditions in the "optical" condensations of Cyg A and in particular, the mass of the gas $(1-3) \cdot 10^8 M$ are investigated. The possible cause of x-ray emission of Cyg A may be thermal (decelerating) radiation in the central part of this source. The continuation of this radiation into the optical range is the observed continuous spectrum of the central part of Cyg A. The mass of hot plasma ($T_e = 5 \cdot 10^7$) should exceed $10^{11} M$. Comparatively dense, cold condensation in this plasma causes the optical radiation. By nature, these condensations are similar to "stationary condensations." Another possible cause of x-ray emission

Card 1/2

UDC: 523.164.42

of Cyg A may be the continuing activity of its nucleus, the dimensions of which should be very small. The situation may be similar in the case of Vir A, although the possibility that x-ray radiation of this object can be a high-frequency continuation of the synchrotron radiation of the jets is evidently more probable. If the x-ray radiation source of radio galaxies is connected with the continuing activity of their nuclei, a variability of the flux of this radiation may be expected. Orig. art. has: 6 formulas and 1 figure. [BA]

SUB CODE: 03/ SUBM DATE: 10Apr66/ ORIG REF: 009/ OTH REF: 009

Card 2/2

DUDKIN, M.S.; SHKLOVSKIY, I.Sh.

Production of fodder yeasts from wheat wastes. Izv. vys. ucheb.
zav.; pishch. tekhn. no.3:44-47 '60. (MIRA 14:8)

1. Odesskiy tekhnologicheskii institut im. I.V. Stalina, Kafedra
organicheskoy khimii.

(Yeast) (Wheat)

SHKLOVSKIY, I.Sh., dots., kand.khim.nauk

Mechanism of gluten formation. [Trudy] VNIIZ no.35:112-118
'68. (MIRA 11:10)

1. Odesskiy tekhnologicheskii institut imeni I.V. Stalina.
(Gluten)

DUDKIN, M.S.; SHKLOVSKIY, I.Sh.

Hydrolysis of hemicelluloses in the lemmas of barley. Izv. vys.
ucheb. zav.; pishch. tekhn. no.1:36-42 '58. (MIRA 11:8)

1. Odesskiy tekhnologicheskii institut imeni I.V. Stalina, Kafedra
organicheskoy khimii.

(Barley) (Hemicellulose) (Hydrolysis)

L 11539-66 ENT(1) GW
ACC NR: AR5011847

UR/0269/65/000/004/0042/0042
523.164.4

SOURCE: Ref. zh. Astronomiya. Otd. vyp., Abs. 4.51.296

AUTHOR: Shklovskiy, I.S.

TITLE: New method for evaluating the density of intergalactic gas ρ_M

CITED SOURCE: Astron. tsirkulyar, no. 303, iunya 12, 1964, 3-6

TOPIC TAGS: galactic, galactic mass, spectral line, resonance line, galaxy

TRANSLATION: A new method is proposed for evaluating the density of intergalactic gas based on MgII (λ 2800). Since the second potential of Mg ionization is fairly high, the ratio of MgII/MgIII would be no smaller than that of HI/HII. In areas of neutral hydrogen, magnesium must be primarily in an MgII state, and in the spectra of quasistellar objects the absorption of the MgII resonance line should be observable. Because such an absorption is not seen, it is possible to evaluate the density of the intergalactic Mg and thence, considering the problem of its relative abundance, the density of H. The sensitivity of this new method is at least 10 times higher than that of the radio method. Bibliography: 8

SUB CODE: 03

Card 1/1

SHKLOVSKIY, I.Sh., kand.khimicheskikh nauk, dotsent

Effect of some reducing agents on the gluten of flour pretreated
with ethanol, oleic acid, formalin, and copper sulfate. Trudy
VNIIZ no.38:183-192 '60. (MIRA 15:12)

1. Odesskiy tekhnologicheskii institut imeni Stalina.
(Gluten) (Reducing agents)

SHKLOVSKIY, I.Sh., kand.khimicheskikh nauk, dotsent

Effect of some reducing agents on the gluten and baking qualities
of flour from overheated grain. Trudy VNIIZ no.38:193-199 '60.
(MIRA 15:12)

1. Odesskiy tekhnologicheskii institut imeni Stalina.
(Gluten) (Reducing agents)

LIVOVSIIY, P.G.; PAL'MOV, Ye.V., professor doktor, retsenzent; KRASNOV, K.V., inzhener, retsenzent; ZAKROCHINSKIY, S.V., inzhener, retsenzent; SHKLOVSKIY, M.B., inzhener, retsenzent; BOGACHEV, I.N., professor doktor tekhnicheskikh nauk, redaktor; AKHUN, A.I., kandidat tekhnicheskikh nauk, redaktor; BARANOV, V.M., kandidat tekhnicheskikh nauk, redaktor; HYZHIKOV, A.A., kandidat tekhnicheskikh nauk, redaktor; FILIPPOV, A.S., kandidat tekhnicheskikh nauk, redaktor; CHERNOBROVKIN, V.P., kandidat tekhnicheskikh nauk, redaktor; YAKUTOVICH, M.V., kandidat tekhnicheskikh nauk, redaktor; GRISHCHENKO, M.F., inzhener, redaktor; ZASLAVSKIY, I.A., inzhener, redaktor; KROKHALEV, V.Z., inzhener, redaktor; SOSKIN, M.D., inzhener, redaktor.

[Manual for the mechanic in a metallurgical plant] Spravochnoe rukovodstvo mekhanika metallurgicheskogo zavoda. Izd.3., ispr.1 dop. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1953. 1112 p. (MLRA 7:4)
(Mechanical engineering--Handbooks, manuals, etc.)

SHKLOVSKIY, M.I.

Magnetometers for mass control of small permanent magnets. Priboro-
stroenie no.1:27 Ja '57.

(MLBA 10:4)

(Magnetometer)

SHKLOVSKIY, M.I., inzhener.

Optimum relations of elements in a magnetic circuit of electro-magnetic time relays. Vest. elektroprem. 28 no.3:50-53 Mr '57.

(MIRA 10:4)

1. Cheboksarskiy elektreapparatnyy zavod.
(Electric relays)

PHASE I BOOK EXPLOITATION SOV/5460

57
Leningradskiy metallicheskiy zavod. Otdel tekhnicheskoy informatsii.

Nekotoryye voprosy tekhnologii proizvodstva turbin (Certain Problems in the Manufacture of Turbines) Moscow, Mashgiz, 1960. 398 p. (Series: Its: Trudy, vyp. 7) Errata slip inserted. 2,100 copies printed.

Sponsoring Agency: RSFSR. Sovet narodnogo khozyaystva Leningradskogo ekonomicheskogo administrativnogo rayona, Upravleniye tyazhelogo mashinostroyeniya, and Leningradskiy dvazhdy ordena Lenina metallicheskiy zavod. Otdel tekhnicheskoy informatsii.

Ed. (Title page): G. A. Drobilko; Editorial Board: Resp. Ed.: G. A. Drobilko, B. A. Glebov, A. M. Mayzel', and M. Kh. Mernik; Tech. Ed.: A. I. Kontorovich; Managing Ed. for Literature on Machine-Building Technology: Ye. P. Naumov, Engineer, Leningrad Department, Mashgiz.

PURPOSE: This collection of articles is intended for technical personnel in turbine plants, institutes, planning organizations, as well as for production innovators.

Card-1/12

Certain Problems (Cont.)

SOV/5460

57
COVERAGE: The experience of the LMZ (Leningradskiy metallicheskiy zavod - Leningrad Metalworking Plant) in the manufacture of modern large-capacity turbines is presented. Methods for the rationalization of basic manufacturing processes and for the mechanization and automation of manual operations are given. Descriptions of attachments and tools designed by LMZ for improving labor productivity and product quality are provided, and advanced inspection methods discussed. References accompany some articles. No personalities are mentioned. There are 26 references: 25 Soviet and 1 English.

TABLE OF CONTENTS:

Foreword

3

I. NEW PROCESSING METHODS IN MACHINING
AND ASSEMBLY

Gamze, Z. M. [Engineer]. The Organization, Methods, and Trends in Efforts for Improving the Easy Manufacturability of Designs for Large Hydraulic Turbines
Card 2/12

5

Certain Problems (Cont.)

SOV/5460

Gurskiy, A. N. [Engineer], S. N. Kupershtok [Engineer], V. N. Yegorov [Engineer], and A. M. Filippov. The Improvement of Assembly Process of Steam Turbines	85
Dolgov, V. A. [Engineer], and S. D. Kuzinets [Engineer]. The Manufacture of Rims and Blades for Radial-Flow Turbines	98
Gal'perin, M. I. [Engineer], and Ya. F. Fiterman [Engineer]. Characteristic Features in the Restoration of Hydraulic Turbines at the Supung GES [Hydroelectric Station]	108
Aristov, A. V. [Engineer]. The Manufacture of High-Pressure Screw Pumps	117
Shklovskiy, M. M. [Engineer], and M. L. Vakhter [Engineer]. The [Ball-] Burnishing of Stainless and Austenitic-Steel Wire	125

II. THE MECHANIZATION AND AUTOMATION
OF LABOR-CONSUMING OPERATIONS

Card 4/22

TASHLITSKIY, N.I.; SHKLOVSKIY, M.M.

New design of large end-milling cutters. Stan.i instr. 34 no.4:
36 Ap '63. (MIRA 16:3)

(Metal-cutting tools)

L'VOVSKIY, Pavel Grigor'yevich; PAL'NOV, Ye.V., prof., doktor tekhn. nauk, retsenzent; SHKLOVSKIY, M.V., inzh., retsenzent; GURVITS, A.I., inzh., retsenzent; NOSENKO, S.M., inzh., retsenzent; SAKHARIN, N.N., inzh., retsenzent; SOSKIN, M.D., inzh., red.; BALAZOVSKIY, M.Ya., inzh., red.; CHAPAYKINA, F.K. red. izd-va; KRYZHOVA, M.L., red.izd-va; MATLYUK, R.M., tekhn. red.; TURKINA, Ye.D., tekhn. red.

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(Mechanical engineering)
(Metallurgical plants—Equipment and supplies)

IVANOV, F.M., inzh.; KUTSENKO, V.N., inzh.; NOVIKOV, Ya.N., inzh.;
SHKLOVSKIY, M.Ya., inzh.

Use of polyvinyl chloride plastics for the waterproofing of bridges.
Transp.stroi. 11 no.3:23-24 Mr '61. (MIRA 14:3)
(Waterproofing) (Bridge construction) (Ethylene)

SHKLOVSKIY, M.Ya., inzh.; PETRISHCHEV, V.B., inzh.; KOSTELYNETS, B.A., inzh.;
OBOZINSKIY, S.M., inzh.

Construction of bridge footings made of reinforced concrete shells in
deposits of gravel and boulders. Transp. stroi. 12 no. 11:23-25 N '62.
(MIFA 15:12)

1. Mostostroya No.2 (for Shklovskiy). 2. Mostopoyezd No.465
Mostostroya No.2 (for Petrishchev). 3. Tomgiprotrans (for Kostelyanets,
Obozinskiy).
(Bridges—Foundations and piers) (Precast concrete construction)

SHKLOVSKIY, M. Ya.

Assembly of 33.5 m. spans using the GKK-120 swing crane.
Transp. stroi. 13 no.3:17-19 Mr '63. (MIRA 16:4)

1. Glavnyy tekhnolog Mostostroitel'nogo tresta No. 2.

(Bridge construction)
(Cranes, derricks, etc.)

SHKLOVSKIY, M. Ya.; CHERKASOV, A. N.; FISHLER, B. N.

The GEPK-130-17.5 swing cantilever railroad crane. Transp.
stroitel. 13 no.4:34-36 Ap '63. (MIRA 16:4)

1. Glavnyy tekhnolog mostostroitel'nogo tresta No. 2 (for Shklovskiy).
2. Starshiy inzhener Vsesoyuznogo nauchno-issledovatel'skogo institut transportnogo stroitel'stva Ministerstva transportnogo stroitel'stva (for Cherkasov).
3. Vedushchiy konstruktor Uglichskogo remontno-mekhanicheskogo zavoda (for Fishler).

(Cranes, derricks, etc.)

(Bridge construction—Equipment and supplies)

VYPOV, I.G., inzh.; KOTER, V.A., inzh.; SHKLOVSKIY, M.Ya., inzh.

Installing bridge foundations on shelled piles with widening
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0 '63. (MIRA 17:8)